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Terra cotta warrior

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TERRA COTTA WARRIOR

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PREFACE

I am kind of worried when I set about writing this paper, since there are too much things to select in this process to talk about and share with you. Filmmaking process is amazing and exciting like magic, and everything needs to be created from nothing like a dove suddenly appears on illusionist's hand. However behind this glaring magic, so many people work deliberately and so many wonderful stories are going on, which are even more dramatic than our film itself. So I even have more enthusiasm to share our story than the story in the film. I want to consider this paper like an interesting manual for the people who interest and research *Terra Cotta Warrior* than an obscure technical treatise.

There are so many people involved this "story" including the members of my committee, schoolmates and friends. Carl Battaglia, Stephanie Maxwell, Geoffrey Alan Rhodes, and Tom Gasek, as advisors, helped me build structure of this experimental film and supported the technique guide for visual effects and animation principle. Jason Mclagan, Linlin Si, Jordyn Ruth, Haoran Li, Hayden Blackmon etc., are my genii and the mainstay in *Terra Cotta Warrior*. They all did great job on their own special field. Without their contribution, *Terra Cotta Warrior* will not exist. Jim Toepper, who was kind of my producer. Because of his kindness and self-motivated personality, I can spent more time and energy on the creative things rather than odd jobs. I cannot list everyone here obviously, however, I want to show my sincere appreciation to everyone who worked for this film. They are amazing and they allowed my imagination come true.

From the production of *Terra Cotta Warrior*, I grow up a lot on film-making experience, communication skill and even the personality aspects. Later, I will talk about how the *Terra Cotta Warrior* came out and how we created and solved the problems.

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MOTIVATION AND THEME OF *TERRA COTTA WARRIOR*

After nearly two centuries of revolution, China faces the dilemma of a spiritual wasteland without faith and without a cultural base to let our souls settle down. The social ills, which stem from the loss of traditional culture, abound in China.

Terra-Cotta Warrior was designed as a kind of succinct review of Chinese modern cultural history. The warrior's encounters and tribulations dramatically allude to what China has experienced in the past almost 200 years. The film explores the crucial causes of Chinese hardships by presenting the cultural-historical context through fantastic means. The technique utilized consists of interplay between pixilation[I] and live action. Pixilation can give life to fantastic details in a very stylistic manner, and the live action portions are necessary for realistic visual stimulation. The coordination of genre, theme and technique offers viewers a unique entertaining experience and also stimulates deep thought and concern.

For a long time it has been my dream to make an experimental historical film like *Terra Cotta Warrior.* My chance came in graduate school when I contemplated the nature and substance of my graduate thesis production, I proposed to make a historical work that would be created in an imaginative way. I was very excited about my thesis.

However, inspiration and reality presented me with many challenges to complete the story and remain true to the concept. The path of my thinking process became very uneven.

HOW WAS BACKGROUND OF MODERN HISTORY OF CHINA EMBEDDED IN *TERRA COTTA WARRIOR*

Throughout history, ancient China is very strong country in cultural aspects. But in today's world pattern, Chinese culture no longer has its original glory. Before 1840, China was a culture exporting country, but why has Chinese culture become weak and why do Chinese people look down on it? I think one reason is Chinese science and technology and quality of life fell behind, but the essential reason was continual cultural problems. In modern times, China has been unable to shake off the label of backwardness. Chinese sages have been looking for the ways to save China. In this process, the traditional culture is the first one to

I **Pixilation** (from pixilated) is a stop motion technique where live actors are used as a frame-by-frame subject in an animated film, by repeatedly posing while one or more frame is taken and changing pose slightly before the next frame or frames. The actor becomes a kind of living stop motion puppet. This technique is often used as a way to blend live actors with animated ones in a film, such as in The Secret Adventures of Tom Thumb by the Bolex Brothers, which used the technique to compelling and eerie effect.

be sacrificed. Material life and scientific technology has been elevated to unprecedented height.

In *Terra Cotta Warrior*, the Warrior[II] (figure1, figure2) represents the traditional culture which accumulated for thousands years and is also the foundation of Chinese culture. At the very beginning of the film, the very ill Warrior comes to ask Doctors, who represent the invaders, to fix his problems voluntarily. This part alludes to the first phase from the Opium War[III] (1840-1842, 1856-1860) to the Westernization Movement (1861-1894) (figure3,

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II **The Terracotta Army** (simplified Chinese: 兵马俑; traditional Chinese: 兵馬俑; pinyin: bīngmǎ yǒng; literally "soldier and horse funerary statues") or the "Terra Cotta Warriors and Horses", is a collection of terracotta sculptures depicting the armies of Qin Shi Huang, the first Emperor of China. It is a form of funerary art buried with the emperor in 210-209 BC and whose purpose was to protect the emperor in his afterlife.

The figures, dating from 3rd century BC, were discovered in 1974 by some local farmers in Lintong District, Xi'an, Shaanxiprovince, near the Mausoleum of the First Qin Emperor (Chinese: 秦始皇陵; pinyin: Qín Shǐhuáng Ling).

The figures vary in height according to their roles, with the tallest being the generals. The figures include warriors, chariots and horses. Current estimates are that in the three pits containing the Terracotta Army there were over 8,000 soldiers, 130 chariots with 520 horses and 150 cavalry horses, the majority of which are still buried in the pits.[1] Other terracotta non-military figures were also found in other pits and they include officials, acrobats, strongmen and musicians.

III **The Opium Wars**, also known as the Anglo-Chinese Wars, divided into the First Opium War from 1839 to 1842 and the Second Opium War from 1856 to 1860, were the climax of disputes over trade and diplomatic relations between Chinaunder the Qing Dynasty and the British Empire. After the inauguration of the Canton System in 1756, which restricted trade to one port and did not allow foreign entrance to China, the British East India Company faced a trade imbalance in favor of China and invested heavily in opium production to redress the balance. British and United States merchants brought opium from the British East India Company's factories in Patna and Benares, in the Bengal Presidency of British India, to the coast of China, where they sold it to Chinese smugglers who distributed the drug in defiance of Chinese laws. Aware both of the drain of silver and the growing numbers of addicts, the Dao Guang Emperor demanded action. Officials at the court who advocated legalization of the trade in order to tax it were defeated by those who advocated suppression. In 1838, the Emperor sent Lin Zexu to Guangzhou where he quickly arrested Chinese opium dealers and summarily demanded that foreign firms turn over their stocks. When they refused, Lin stopped trade altogether and placed the foreign residents under virtual siege, eventually forcing the merchants to surrender their opium to be destroyed. In response, the British government sent expeditionary forces from India which ravaged the Chinese coast and dictated the terms of settlement. The Treaty of Nanking not only opened the way for further opium trade, but ceded territory including Hong Kong, unilaterally fixed Chinese tariffs at a low rate, granted extraterritorial rights to foreigners in China which were not offered to Chinese abroad, a most favored nation clause, as well as diplomatic representation. When the court still refused to accept foreign ambassadors and obstructed the trade clauses of the treaties, disputes over the treatment of British merchants in Chinese ports and on the seas led to the Second Opium War and the Treaty of Tientsin.

These treaties, soon followed by similar arrangements with the United States and France, later became known as the

figure4). Through out the Opium war, Chinese people began to feel inadequate on the technological aspect, so the Qing government wanted to learn the Western "ships and armament," so that resist invasion of western countries.

Later, Doctors make "operation" on him and steal the treasure in his belly. This scene represents the phase occurred between the Sino-Japanese War[IV] and May 4th Movement[V]. In the background that China was partitioned by western powers and almost conquered. In this period of time is almost the worst time of China ever experienced.

Figure 1

Figure 2

Figure 3

Unequal Treaties and the Opium Wars as the start of China's "Century of humiliation."

IV **The First Sino-Japanese War** (1 August 1894 – 17 April 1895) was fought between Qing Dynasty China and Meiji Japan, primarily over control of Korea. After more than six months of continuous successes by Japanese army and naval forces and the loss of the Chinese port of Weihaiwei, the Qing leadership sued for peace in February 1895.

V **The May Fourth Movement** (traditional Chinese: 五四運動; simplified Chinese: 五四运动; pinyin: Wǔsì Yùndòng) was an anti-imperialist, cultural, and political movement growing out of student demonstrations in Beijing on May 4, 1919, protesting the Chinese government's weak response to the Treaty of Versailles, especially the Shandong Problem. These demonstrations sparked national protests and marked the upsurge of Chinese nationalism, a shift towards political mobilization and away from cultural activities, and a move towards populist base rather than intellectual elites.

The broader use of the term "May Fourth Movement" often refers to the period during 1915-1921 more usually called the New Culture Movement.

At the end, Red Stars break into the barn and kill Doctors. Then they put the new heart into the Warrior's body again. Because of the sharp pains, the Warrior cuts his chest and takes his heart again. Finally, inside of his heart is a steamed bread[VI] (figure5) which is eaten by

Figure 4 Champion Empress Dowager Cixi, Zhang Zhidong, Li Hongzhang (from left)

the Warrior in the end. The last scene indicates the period from the May 4th Movement until now. Sun Yat-sen and Kang Youwei (figure6 from left) as representatives figured out the Chinese society system as deficient, and began to study western political systems and instituted political reform. As May 4th Movement erupting, Chen Duxiou, Hu Shi, Lu Xun (figure7 from right) as representatives began to recognize shortcomings of the Chinese traditional culture and they launched the New Culture Movement. Its aim is both killing traditional Chinese culture and fully introducing a new culture into China. Through out the 10 years of hard combat, CCP[VII] won the war. After the founding of people's republic of China, the development of industrialization and economy is this period's theme. Money pursuing becomes whole society's value-orientation. Traditional Culture becomes the tool of making money rather than crutch of spirit.

Figure 5

VI **Mantou**, often referred to as **Chinese steamed bun/bread**, is a kind of steamed bun originating in China. They are typically eaten as a staple in northern parts of China where wheat, rather than rice, is grown. They are made with milled wheat flour, water and leavening agents.

VII **The Communist Party of China (CPC)**, also known as **the Chinese Communist Party (CCP)**, is the founding and rulingpolitical party of the People's Republic of China (PRC). Although nominally it exists alongside the United Front,[1] a coalition of governing political parties, in practice, the CPC is the only party of the PRC,[2] maintaining a unitary government and centralizing the state, military, and media.[3] The legal power of the Communist Party is guaranteed by the national constitution.

Figure 6

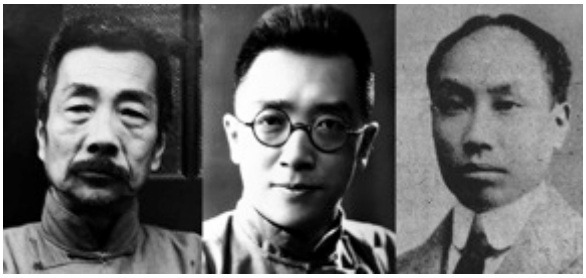

Figure 7

In the continuous reforms of 170 years, Chinese beneficial traditional culture was ravaged over and over again. People have gotten lost in the mighty exotic cultural invasions, and begin to behave without any moral measure. Various social ills arising therefrom are coming in thick and fast.

TERRA COTTA WARRIOR- FILM PRODUCTION TECHNOLOGY

PRE-PRODUCTION

■Storyboard design and shot list in the objective circumstances

Following the concept design of *Terra Cotta Warrior*, storyboard design, locations search, casting, and the design and manufacture of costumes, and props and scenery became specific implementations in the pre-production stage. Based on the experimental art style of this film, every aspect of pre-production and production presented considerable challenges. Specifically for this film, storyboarding, choosing locations, and casting actors took place simultaneously. However, in retrospect, in the early stages of pre-production, it now seems that spending more time and energy in researching the storyboard/shot list first would have been a more efficient and effective approach reasons why:

1. The lack of experience and opportunities for student directors to be highly professional in their approach to a production can be very stressful. One solution to deal with the confusion and lack of knowledge is to concentrate on the storyboard very early in order to predict and plan the work.

2. *Terra Cotta Warrior* is an experimental film, many techniques need to be researched and tested in advance to prove their effectiveness and appropriateness. In particular, the animation aspect of the work was very challenging because of my lack of experience of with animated form.

3. Many people were involved in this production, and I didn't have a producer, which means I could devote most of my attention on communicating with the animation director and the director of photography. As the director, I needed to pay attention to EVERY aspect of the creation of this work, no matter how small it was. In order to be more effective, it would have been better during the pre-production phase to be able to determine and schedule the numerous aspects that would demand my attention so that it would not become so unpredictable and inefficient. For example, better preparation could have prevented spending long times discussing shots with the cinematographer and animation director while the actors were waiting on the set.

It is important to understand the significance of establishing the 'shot list'. This is a very exciting and agonizing process. The shot list for *Terra Cotta Warrior* experienced 10 revisions, from the first version to its final construction before shooting began. In countless team meetings, the animation director and I changed our shot ideas over and over again. These changes were necessary because of the limitations of the pixilation technique and for concerns that would presented in later post-production (especially, enhancing the film dynamics and visual effects), as well as budget constraints. As mentioned before, in line with the theme and experimental art style of this film, we worked to introduce unconventional shooting manners that would integrate both live action and pixilation technique. As a live action focused director, I had little experience with animation. Therefore, I found necessary to work with someone who was very well versed in the art form and technique of animation, and who would play a major role in the production of this film. I approached Jason McLagan, who is an undergraduate in the School of Film and Animation program and who is a very gifted stop motion animator. He agreed to being the animation director on my film and he became the most important member of the team and my closest collaborator on this film production. For nearly two months Jason and I met at least twice a week to the discuss the many and varied aspects to accomplish the technical production of the film: camera position, special effects, design of the costumes and props, and even the equipment we needed to use. This interaction with Jason through this process taught me about the complex relationships of so many details that could affect the overall aesthetics and practicalities of the visual design of a film. For example, in order to contrast the actual Terra Cotta Warrior with the surrounding environment, there were a number of ways to approach this. Jason and I decided to adopt the technique of combining live action and with pixilation in the same shot. This meant that we had to discover specific manipulations in the shooting of the Warrior using traditional live action techniques, and then filming the doctors and red stars using the pixilation technique to achieve their robot-like motions that together create the eerie atmosphere within the film.

Because of these two quite different filming techniques, post production compositing would be necessary in this film. Therefore, the planning of these kinds of special effects became a very important strategy during the process of storyboarding and creating the shot list. This helped to reduce time and budget limitations and other difficulties of the production, including the workload of post compositing. An example of this is in the first scene where we applied over-the-shoulder perspective to shoot the Warrior stepping into the office. Shooting this not only allowed the audience to see the strong contrast of different movements between the Warrior and the Doctor -- one walks step by step, while the other slides on the ground, it also allowed us to bypass the work-intensive technique of rotoscoping that would be necessary in order for the two characters to exist in the same space when there is the intersection of their bodies (figure8).

Another example of planning ahead on visual design in this work is with the props and costumes. In order to create the greatest sensory and kinetic viewer reaction in the scene when the Warrior undergoes the surgical cutting open of his stomach by the Doctor, I originally thought we could create a close up shot that looks down the axe handle as it hits and cuts open the Warrior's "belly" with blood spraying while the hand of the Doctor pulls out his internal "organs". In theory, this might have been able to be achieved using a 3D animation technique. However, the production cycle could not accommodate the amount of time needed to produce this segment in 3D. Another way would have been to make a separate dummy prop of the Warrior's torso. But this was not possible because of the limited budget, and it was, in practice, very risky because there would an element of unpredictability on the 'performance' of the prop itself (the amount and direction of the burst of blood when the belly is axed open) that might require too many retakes. The prop idea would also introduce costuming concerns when the axe strikes the torso -- the materials used for this would require a lot of expense and time to be tested before shooting. Too much work and too many uncertainties. Therefore, we decided to use the second best solution: Applying the "overlapping" technique in After Effects[VIII]. We achieved this by filming the action of the doctor's hand reaching downwards (into the stomach) as a base layer and we composited a shot of the Warrior's belly on top of the hand shot to give the "false impression" that the doctor's hand was reaching into the body of the Warrior. We needed to stage these shots (camera angles, horizontal positioning of camera, etc.) for their later compositing (figure9).

If the two examples above elaborate the relationships between shot design, prop design, and special effects in post, it must also be emphasized how the camera

VIII **Adobe After Effects** is a layer-based digital motion graphics and compositing software published by Adobe Systems, used in the post-production process of filmmaking and television production. Its main uses are the origination of 2D and 2.5D animation, visual effects compositing and finishing (image adjustment, color correction etc.).

position and the shooting location influenced the storyboarding of *Terra Cotta Warrior*. But first, a little bit about workflow…

Figure 8

Figure 9

Storyboarding absolutely relates to workflow, especially for student productions. I chose to find the location first and then did the storyboarding later because we could not spend too much on renting a location or "building" a site. Therefore, we needed to conform shot design with the location. For example, in the first scene of the film when the Warrior and Doctor move towards each other we originally designed the shot so that we watch a side view of the two characters move towards each other to express that they oppose each other and will potentially fight each other. However, the shooting site was a barn and the shooting space extremely limited and cluttered with small tractors and other objects that could not be moved (figure10). This forced us to consider other camera angles and shooting strategies, hence, the over-the-shoulder shot (figure11) as discussed previously. This is an example of how circumstances can force the filmmaker to improvise and still find creative solutions that are beneficial and many times better than the original plan. This experience shows that being a filmmaker means being open to change and that these kinds of challenges will always arise and the filmmaker needs to be ready to deal with them creatively.

Figure 10

Figure 11

There are times when the location itself will dictate the shot design. For example, the scene with the doctors preparing the surgery on Terra Cotta Warrior is supposed to be almost cartoony. The shots had to be created to convey a cartoonish style. Originally, I thought of using a group of close ups of the Doctors moving around medical equipment, however, close ups cause the animation dynamics and the pixilation movements to be lessened or lost altogether. This breaks with the pixilation style of

the film. Thus we used wide shot to show the cluster of the Doctor's interesting actions that also conveyed their cartoonish movements (figure12). Luckily, the barn had a second floor that was a wooden open platform overlooking the area of the Doctors' performances below (figure13). We used a C-stand[IX] to fasten the camera (Canon5D) to in order to reach beyond platform and shoot downwards using time lapse[X] to create a visual effect of pixilation that sets off the eerie atmosphere (figure14). (The specific time lapse technique we used will be discussed this below.)

For low budget productions in the first stages of the shot design, there are many shots that must conform to the actual location. However, a given location also offers the opportunity for inspiration and to find creative shooting alternatives that could not be planned on and are feasible for the film.

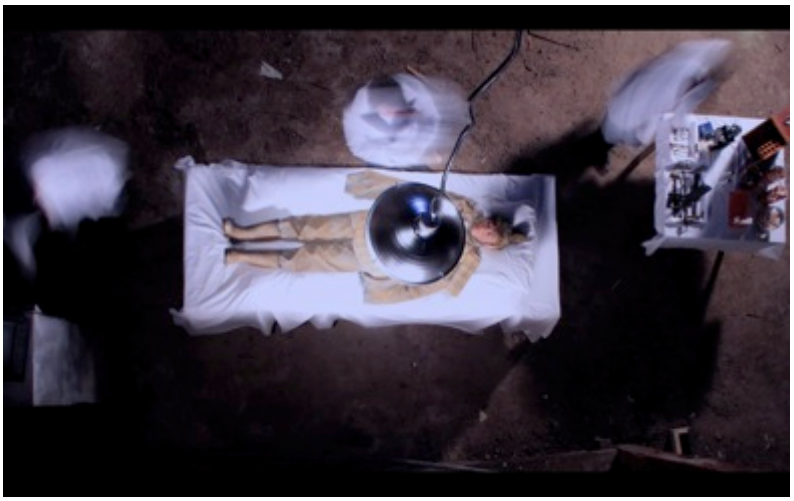

Figure 12

IX In film production, a **C-stand** is a piece of equipment used by the grip department to accomplish various rigging and light modification tasks.

X **Time-lapse photography** is a cinematography technique whereby the frequency at which film frames are captured (the frame rate) is much lower than that which will be used to play the sequence back. When replayed at normal speed, time appears to be moving faster and thus lapsing. For example, an image of a scene may be captured once every second, and then played back at 30 frames per second; the result would be an apparent increase of speed by 30 times. Time-lapse photography can be considered to be the opposite of high speed photography.

Processes that would normally appear subtle to the human eye, such as the motion of the sun and stars in the sky, become very pronounced. Time-lapse is the extreme version of the cinematography technique of undercranking, and can be confused with stop motion animation.

Figure 13

Figure 14

■Location Search

Although shot design took most of the energy and time in the pre-production of *Terra Cotta Warrior*, there were many other important aspects to consider during this phase. The location selection for *Terra Cotta Warriors* was the easiest part of preproduction process. The barn is owned by the Businessman actor, who is also my friend, Jim Toepper. Other schoolmates have used this barn as a shooting location. However, since the filming occurred during the cold winter months we needed to heat the barn. Fortunately, the barn had electricity and we could bring in heaters, as well as power our equipment. Also, we were lucky that there were a lot of objects in the barn that we used as props and set decorations, such as: the Doctors' office desk and the surgery table. Jim also provided a table lamp, tablecloth, a chair and other props from his house near the barn. We were lucky for the convenience that came with the location and Jim's kindness and support of this project!

■Cast selection

The selection of cast didn't go as smoothly as securing our location. However, the choice of the lead actors went well because I had worked with them on other productions previously. This is a kind of networking effect. Jim Toepper, who plays the role of the Businessman in the film, was a great team player throughout the shooting process. Moreover, his appearance and demeanor fit the image of businessman type in the19th century. The General was acted by Ian Kransser who also successful worked with me on a previous production. He is extremely creative on site. However, the main reason I selected him was that he is big and tall and he has special facial features that work for the role. The choices of actors to play the Warrior and Priest were also based mainly on physical characteristics, but they were also very

enthusiastic about acting in the film. An enthusiastic actor can learn a lot during a production, even if he/she is a professional actor. Because the actors in this film had to perform their actions in a nontraditional style (pixilation) and there was no dialogue, I needed to concentrate on the actors' abilities for exaggerating facial expressions (figure15) and using body language (figure16) to convey information. Therefore, choosing actors for traditional live action roles is different than for experimental works like *Terra Cotta Warrior*. It is important that a director or producer explore the actor's specialty or ability to perform the style and genre of the film.

Figure 15

Figure 16

A crowd of 30 extras played the Red Stars in *Terra Cotta Warrior*. Collecting this many people largely depends on good communication skills and also a feasible schedule. Also, it is challenging to attract people into extra roles, especially if they are not paid to perform. It is important to clearly describe the work, pique the interests and draw the attention of potential actors. Certainly, my task in recruiting actors for *Terra Cotta Warrior* was easier than what might happen in the real world, since most of the actors were my schoolmates or friends. They did great job on this project, and I want to express my heartfelt gratitude to them for their selflessness and outstanding talents.

■**Design and manufacture of props and costume**

I think design and manufacture of the prop and costume is the most intractable and challenging part in the whole pre-production process. However, actually the art direction work of an experimental film such as Terra Cotta Warrior is most difficult also is quite simple comparing to other genre. Characters (including their costume), scene and situation in an experimental film are all the results of imagination, which rely filmmaker's subjective world greatly rather than representing real objective world that fiction or documentary film peruses. Thus basically everything is created out of nothing, and little work might be referred. In order to emphasize the creepy and horrific atmosphere, we introduced organ containers, old style desk lamp, hacksaw, axe, and industry-like hanging lamp in the laboratory design. We didn't clean thick dirt on the ground and cobweb in the barn, which right are the best decoration of the set (figure17).

Figure 17

The design of red stars is one of our most successful achievements. Because the red five pointed star represents The Communist Party of China[XI] in the first half of 20th

XI **The Communist Party of China (CPC)**, also known as the Chinese Communist Party (CCP), is the founding and ruling political party of the People's Republic of China (PRC). Although nominally it exists alongside the United Front, a

century, this concept suppose to be contained in the design of "army" uniform. We discussed many kinds of plans, for instance, manifesting red star symbol on cloth, hat, sleeve emblem, epaulet and so on. However, all these ways are not direct enough and lack of power and impact. The ironic theatrical effect we want to express is totally absent. For highlighting this group of people's power and the strength, we decided to make them look supernatural rather than real human being-like. An idea of a easy way to make it come true is covering their faces and give them red five pointed star heads. Then this group of army turned into "walking red stars"(figure18). This way enriches the character symbolic meanings and make them more interesting and cartoon-like. Moreover it also relaxed the request to the actors for their faces are blocked. This is another case unified creation and the objective condition. As for stars' uniforms, we had two alternatives, one is cloak. The inspiration of it came from the Dementor[XII] in Harry Potter who is strange, formidable and supernatural. Another is Chinese green military uniform, which used right after the Chinese Resolution[XIII]. After deliberation, we decided to select the second plan (figure19). The primary reason is that the green military uniform may cause the audience to associate with the real object we suggested. While the cloak covers body too much, so physical performance and animation dynamic are sacrificed. Moreover, cloak also brings actors inconvenience when they move.

Figure 18

coalition of governing political parties, in practice, the CPC is the only party of the PRC, maintaining a unitary government and centralizing the state, military, and media. The legal power of the Communist Party is guaranteed by the national constitution. The current party leader is Hu Jintao, holds the title of General Secretary of the Communist Party of China.

XII **Dementors**, in the *Harry Potter* books, appear to have a generally human shape, approximately 3 meters (10 feet) in height, but covered in dark, hooded cloaks that reveal only grey, decayed hands. The wraith-like creatures have no eyes, and there is a large hole where the mouth should be.

XIII **The Chinese Revolution** in 1949 refers to the final stage of military conflict (1948–1952) in the Chinese Civil War. In some anti-revisionist communist media and historiography, as well as the official media of the Communist Party of China, this period is known as the War of Liberation.

Figure 19

On the contrary, the art direction task is also relatively simple in the experimental movie since your creation won't be restricted too much. Although the main character Terra Cotta Warrior is closely related to the real history, we still don't need to rigidly adhere to history. Because this "Terra Cotta Warrior" is a character in an fantastic experimental film rather than the real object a history drama represents. The same goes for other situations, I don't need to study doctor's clothing at the beginning of the 19th century also no need to consider if x-ray machine was already invented in that period of time. Therefore, the costume design also can be really flexible. For instance, according to the storytelling need, three doctors all have dual statuses. I just simply overlay the merchant, priest and general's clothing with white doctor coat. I did some research roughly about the clothing of these three professions at the beginning of 19th century in western world. The outer layer is current doctor's white coat, which doesn't conform to the historical characteristic. That just simply shows the doctor's identity. However, this costume is very bizarre and cartoon-like which match their performance very much and also increase the satire and surrealistic visual effect

Comparing design, the manufacture is even more difficult. Linlin Si is art director in *Terra Cotta Warrior*. He has rich model manufacture experience and knows many kinds of material's characteristic in each use very well. His artistic sense and practical ability are also splendid. The contribution and the efforts he made enabled Terra Cotta Warrior come alive. "Obviously, the Terra Cotta Warrior wasn't made of

clay." Linlin said when someone asked the detail of Terra Cotta Warrior's material. So prop and costume design suppose to be artistic, practical, also economic.

Firstly, we pursue aesthetic perception. For, we make it close to the real object. Real Terra Cotta Warriors are well made. The finest part even can be seen such as the texture of threads going through the holes on the armor. Although they are made of clay, which is hard and heavy, the soft and light texture of the cloth still shows up naturally (figure20). So real Terra Cotta Warrior is heavy and also "light". Based on these characteristics, burlap is good material of the shirt underneath the armor. For reach the clay's heavy texture, we paint it with different kinds of lacquers to make the cloth colored as clay's surface also harder and heavier. There are several kinds of spray paint were tested for color-match, our conclusion was that use sand, brick and light gray as base color, then sprayed one kind of multicolor lacquer mixed with rough particle enable the cloth surfaces to appear as the surface of clay or brick (figure21). The idea of making Warrior hair is that comb the long wig into a bun on the back and use glue and rubber band to make it stable enough. Because generally Terra Cotta Warrior is bun is round and big, we need to "plump" it in the condition of the hair quantity is insufficient. We used a piece of foam well cut into similar shape to support the bun. The final result coming out was pretty satisfied. However the wig isn't like real hair can be combed in good shape. So after we finished everything the surface of the hair is still pretty rough. We just made the best appearance in ours competence (figure22).

Figure 20

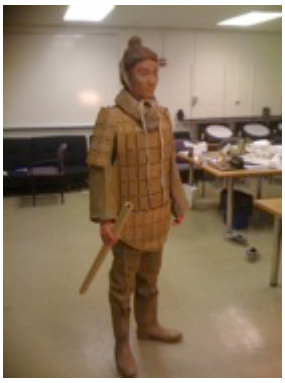

Figure 21

Figure 22

Secondly, for the practicality, light, easy to put on, durable is the key. The armor supposes to be light and look like real. The foam board is an ideal material for that. Because of the rough surface, wearing a thick layer of propylene pigment, it might appear as clay surface. After measuring, we cut the board into blocks in appropriate sizes and then sticked blocks on two pieces of plastic flooring in vest shape (figure23). The embryonic form of the warrior's armor already came out. The reason we chose plastic flooring is that it is solid and also flexile, which suits being perforated and tethered. In the manufacture, we let its reverse side faces outward, because the paper surface is easy to color; and let its face side in since the plastic side is smooth, which can reduce friction and make it easy to put on, even if it is very tight. The final procedure is drilling the edge of three pieces of plastic flooring and fixing it by cotton ropes.

Figure 23

Thirdly, because of the budget limitation, we have to find the most economic way. For instance the major color of Terra Cotta Warrior's undershirt is gray. If we use propylene painting colors or spray-painting, it may cost $10 to $15. It is sort of expensive. So I chose cloth dye. A little packet is enough, which just cost $3. For his shoes I also select the cheapest rain boots and they are in ideal situation after being painted. I just spent $10 on it. The merchant's costume is more like daily-wear

clothing so I didn't hurry to buy and tried to ask around to borrow some. Fortunately, Jim Toepper has a black suit matching very well and I saved another $30-40.

Certainly, due to the space limit, all the things I state by far cannot cover all the issues in the process of pre-production. The whole process of making a film is like a iceberg, there into, pre-production just like the underwater part that is more huge than what we see. There is a Chinese proverb named: One minute on stage and ten years of practice off stage. I want to say a filmmaker should exhibit calm endurance of long period of depression, pain and difficulty. The inspiration will survive the winter, when spring comes; it will emerge in its full splendor and bloom on the screen.

PRODUCTION PROCESS

■The technology we applied in the production process

First, I would like to share with you about the technique we used during the production process, and the unconventional means of shooting we search for under the objective circumstances.

● The "abnormal" way of the pixilation

As I mentioned above, the art style of Terra-Cotta Warrior is embodied by the acting contrast between Terra-Cotta Warrior and other characters, namely, the normal live action shooting on the Terra-Cotta Warrior, and pixilation techniques used on others. I prefer to introduce the concept of pixilation firstly. Pixilation (from pixilated) is a stop motion technique where live actors are used as a frame-by-frame subject in an animated film, by repeatedly posing while one or more frame is taken and changing pose slightly before the next frame or frames. The actor becomes a kind of living stop motion puppet. This technique is often used as a way to blend live actors with animated ones in a film.(from Wikipedia). Obviously, it's traditional pixilation shooting method. However, in *Terra Cotta Warrior*, we give the pixilation technique new contents. A simple reason of doing this is that we don't have that long period of time to shoot frame-by-frame. *Terra Cotta Warrior* is planned coming out as 11 minutes, if we follow the tradition pixilation shooting technique, just the shooting process may take several months, it is impossible for a work which has to be finished in a year.

To achieve the pixilation art effect within a short time, we have to use an abnormal and conventional approach of the photography. My first response is that still using traditional live action way of filming, and withdrawing frames in the post. Theoretically speaking, this method is feasible, but there are two defects: firstly, the live action is too consistent and even, which cannot create the mechanical feeling and cartoon-like style like pixilation way does. Rather than

that, it looks more like the player cannot play the video swimmingly; secondly, post will be like a disaster, because too much frames need to be taken out. The normal frame rate of live action shooting is 24 frames per sec, but the stop motion probably just need 10 pictures per sec (10fps). It means I need to take almost half of frames from the original video. So this idea is not smart at all.

Canon 5D is what we planned to use during the shooting, and it has a very important function is shutter burst and its speed is 6.3 fps. It reminds us we can take advantage of this to shoot the most shots as "fake" pixilation (Fantastic actions cannot be shot in this way, for example, doctors slide on the ground or fly away and drop on the ground). Because of the low shutter speed, Animation director Jason directed all the characters acting slower than normal level and exaggerating all the actions a little bit, the purpose of which is avoiding the smooth live action effect and also give actors more space to explore their actions. Burst shutter technique solves our schedule problem and makes the physical action easier. Because of its good visual effect and convenience, more and more filmmakers begin to apply this technique in the production.

● The Time lapse technique

I already mentioned time lapse technique above a little bit and also explain it roughly. Now I will elaborate this particularly. I think the basic idea of the time lapse is for representing things, which objectively going on in long term, in very short period of time. For example it shows the process of a flower blooming in 5 seconds. It shows the fantastic characteristic of the time itself. Therefore this shooting way is usually used in the fantastic films or works such as Terra Cotta Warrior. As I mentioned before, comparing the Terra Cotta Warrior, these doctors are supernatural and ghost like. Time lapse technique matches this style very well since it can create blur effect (figure24) when the object moves by stop motion technique.

Figure 24

By far, for explain the operation clearly, one device need to be introduced——intervalometer (figure25). An intervalometer is a device, which counts intervals of time. (Other names include interval meter and interval timer). Such devices commonly are used to signal, in accurate time intervals, the operation of some other device. In photography, intervalometers are used to trigger exposures. This is often done for a time-lapse series. Often the purpose of a photographic intervalometer is to post-process them as similar images could be obtained by having the camera continuously take pictures in certain interval as accurately as possible. Therefore when it interfere camera, it can control time exposure enabling the moving doctors to be confused, at the same time it operates the intervals between each exposure which make the undercranking cinematography come true and we can adjust replay speed by copying frames or removing some of them.

Figure 25

When we shot this scene, the set up is really challenging which cost we several hours. First thing is we have to find a good way to set the camera and make it easy to operate and save. We tried several ways and the successful one is that the camera was tied on the end of boom pole[XIV], and we let it stretch out making the camera hung over the operation table by using a C-stand supporting and making it stable (figure26). Because in this way, Director of Photography cannot reach the camera, so we have to connect it to a computer as monitor. (We also can use one animation software Dragon to see the final effect of this time lapse shot so that to judge if another take is needed) (figure27) That brings us more work, for example find more source and heat for warming up the computer. Although all these takes us long time and really challenge us a lot (Anyways, the camera is hung in the air looks really dangerous.) the experiences we got and the shot coming out of it make all the work really worth.

XIV A **boom pole** can be attached to the top of the stand in order to allow the placement of the microphone to be moved.

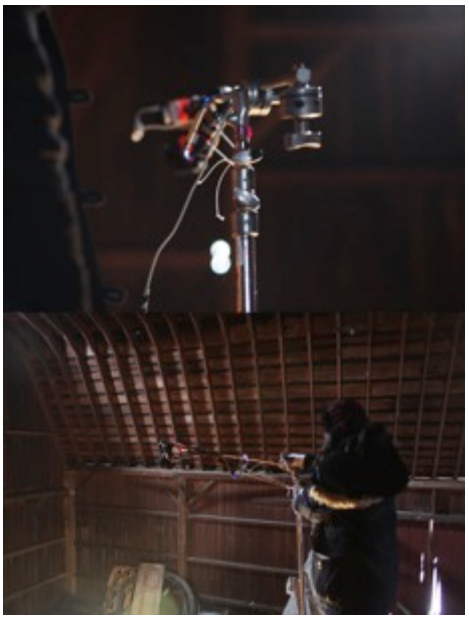

Figure 26

Figure 27

● Special effects technique applied in production process

As you imagine, a lot of special effect shots suppose to be applied in fantastic experimental films. Terra Cotta Warrior is not an exception. In Terra Cotta Warrior, special effects were almost applied in every shot literally. The workload of compositing occupied 50% of whole postproduction. By far, someone will probably ask: Special effects works usually belong to the postproduction and why do you mention it in the production process section? Actually, my experience tell me introducing and caring more special effects technique in the shooting process, the more convenience and extra time you get in the post. If you don't really care about this issue on the shooting site, the post work gonna be very suffering and a lot of time and energy will be consumed on fixing the “mistakes” in shots rather than raising the visual effect of the image. This issue is even more important in student film production since we don't have Hollywood’s team which even contains a group of people named Rotoscope Department!

For instance, a shot shows Terra Cotta Warrior is struggling painfully on the operation table with doctors around, and at the same time, the general is taking the “organs” from his belly. Camera was set at the end of the bed and the angle is very low, so we can see warrior’s head blocked part of priest who stood at another end of the operation table. No doubt, this shot must apply the composition technique because of the action of taking “organs”, so we just simply shot Terra

Cotta Warrior's action singly with a green screen behind his head for keying[XV] him from the priest (figure28). The same thing applied in the next step: filming doctors' action with a green screen keying out the general's hand and treasures with absolute same camera's poison and angle. However, when we composited the two layers together, the problem showed up. I didn't recognize in the low-light condition, Warrior's hair is very difficult to be keyed out and rotoscoping hair almost equals to suicide, which just can be practiced in industrial environment. This flaw messed up the whole image badly although we already tried our best to fix it in many ways. Haoran Li who supervised the special effects told me the green screen behind Warrior's head is unnecessary and I should shoot Warrior and priest together. At that point I regretted a lot and also shouted at him why he didn't come that day. From here you can see another key is that the people who supervise compositing has to be on shoot site, even if the technique you apply looks so easy.

Figure 28

XV **Chroma key compositing** (or **Chroma keying**) is a technique for compositing (layering) two images together. A color range in the top layer is made transparent, revealing another image behind.

The principal subject is filmed or photographed against a background consisting of a single color or a relatively narrow range of colors, usually blue or green because these colors are considered to be the furthest away from skin tone. The portions of the video which match the preselected color are replaced by the alternate background video. This process is commonly known as "**keying**", "**keying out**" or simply a "**key**".

If the last one just can be considered a mistake, this lesson was totally from our ignorance of the technology. In the scene of metal parts raising up by magic power of red stars, we cannot film the medal parts in several hours on the site, because too many people involved in this scene and I don't want all the actors waiting. Therefore we decided to shoot metal parts rising up in the studio. Because this shot is tilting up to follow the parts raising up, we use the animation gear head to control the angle of every tilt and record all data to make sure the background can match the movements of the parts. However, in the studio, we figured out the perspective of parts arrangement is so difficult to match red stars and background's perspective. We recognize we need to record some other data such as the height of the camera, the distance between camera and the edge of the bed and so on (figure29). This experience did teach me a lot.

Because Terra Cotta Warrior is an experimental film, we gave a lot of technical tries in this production process. Through these experiments, we gain a lot containing the happiness of success also profound lessons.

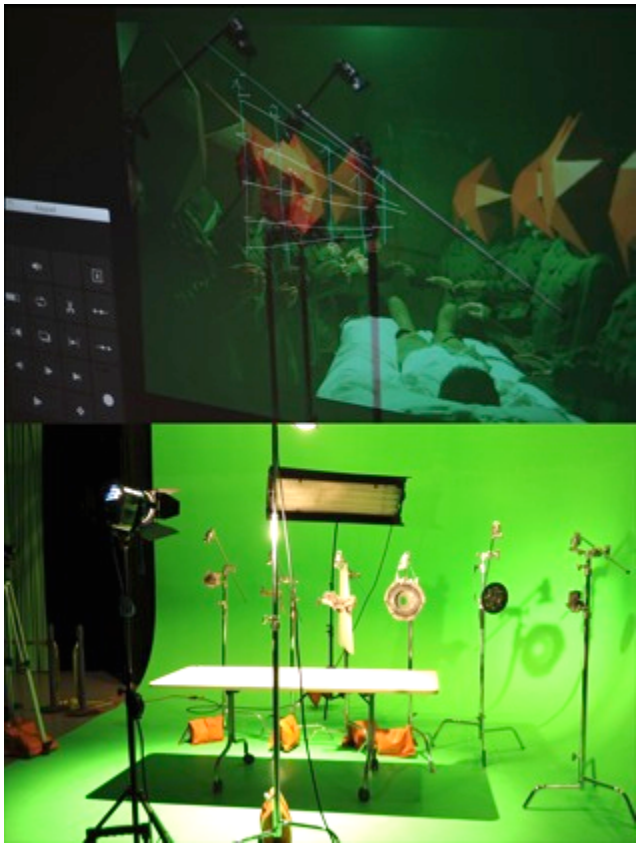

Figure 29

■Human factors in the shooting process

Essentially, filmmaking is a group work. Behind an excellent movie, there must be a group of outstanding people rather than just an talented director or a famous producer. So as a director——the leader of the crew, managing them and allowing everyone's talent get brought into play by the greatest extent is significant task.

There is a Chinese proverb named: Steer clear of untrustworthy people, but trust your comrades at work. This rules is especially suit for the filmmaking world. The shooting site is usually likened to a battlefield. On the battle, the general must trust his soldiers unconditionally facing to the powerful enemy, or the army will get badly strung out and lose their battle effectiveness. The same thing happens in the filmmaking process too. Once the estrangement comes out in a production crew, the creation must be influenced. The best way to avoid the misunderstanding according my experiences is that trusting your crew and allowing them create things satisfying their own first, in condition of no going too far away. Certainly the precondition is that they are my choices after careful selecting. This way can let everyone in the crew has the sense of belonging, namely, they will consider it as a chance to reach their own achievement rather than just a calling or a help. Especially for the no pay work, it's absolutely the truth.

In whole process of making Terra Cotta Warrior, fortunately, I got a group of talent people. Everyone is easy-going and very involved in this project. I think the good result comes from their good quality also related to my way of getting along with them. The good example is the work relationship between Jason Mclagan and I who is the animation director in Terra Cotta Warrior. Be honest, psychologically, I considered him as another director, who has the same right and status as me in this production, rather than the second one, just because he is an expert on pixilation and also has a creative and aggressive heart. I am not an animator before Terra Cotta Warrior, so I have to find person who is good at this technique and can be depend on some aspects.

Because of the open atmosphere everyone told me their true thoughts without any apprehension and I got chance to learn a lot from them. On shooting site, Jason is very dedicate and solved a lot of problems we met accidentally, he is always active like a generator of the whole crew. The rare quality of him is that the better ideas always can come up from his mind even in the very intense environment. For example, the shot of metal parts being handed over by red stars one after another was designed differently originally. My idea was letting the metal parts automatically appear in red stars' hands. Although this method offers the fantastic and interesting effect, I didn't consider the element of special effects work contained and the absence of dynamic in this shot until Jason told me: Bin, wait a second, we need to consider this again. As you know I accepted Jason's suggestions on the site and the result came out is awesome (figure30).

Figure 30

However, everything has two sides. After all, this work just belongs to one person who supposes to know what he (she) really wants. So to make persisting and compromising get balanced is very important to a student director. My method is to tell the people who give me suggestions that I like his (her) idea a lot, but we don't have enough time to discuss and let others waiting and we have to keep going as we scheduled. I never explain more and comfort my crew until the break in between, since the time is most valuable thing on the site and also sometimes showing the forceful side is necessary.

As you know, people are always having the surge of emotion, which is affected by the environment even just a bad weather. All these elements will influence the whole crew. It was very cold in the barn when we shot there, plus someone is hungry; someone is bored and someone is under pressure. Therefore, besides learning to control my negative emotion, getting people work together with complementary personalities is necessary. For instance, In our crew, Jason, Jordyn (My DP) and I are good combination and pretty like the three parts of a vehicle——generator, wheels and steering. When Jason and I had disagreements and in the stalemate, Jodyn always could find a way letting both of us compromise to get the middle course. While, when Jordyn and I were all tired of something or stuck by a problem, Jason was always the one who still can drive us move with his passion. When Jason and Jordyn take very long time to be entangled with some technique problems, I will give them a decision soon to avoid delay.

Anyhow, I think learning how to communicate with people is always the first thing in any field. Better say interpersonal relation is art than science. In this case, doing well on this aspect need to feel it like an artist and summarize your every experience.

POST PRODUCTION

As I mentioned before, *Terra Cotta Warrior* contains a lot of post work. I will introduce the technique we applied first.

■2D Animation applied in *Terra Cotta Warrior*

Except the shot of the clay peeling from the Warrior's armor, the software we used in every special effect shot is Adobe After Effects. It means 2D compositing is our main manipulation although Terra Cotta Warrior is 3D visually.

Actually, the only thing we created from nothing is the shot achieved by Maya[XVI]. Linlin did great job on that (figure31). The basic principle is 3 steps: 1 modeling a piece of block of armor. 2 Tracking[XVII] (namely, "sticking" the model we created on moving Warrior.) 3 Particle (allowing the clay break off and drop.) Except these, all the things you see were scrabbled up; in this case we had a lot of source materials, which came from making the object in practice and taking a bunch of pictures.

Figure 31

XVI **Autodesk Maya**, commonly shortened to **Maya**, is 3D computer graphics software that runs on Microsoft Windows, Mac OS and Linux, originally developed by Alias Systems Corporation (formerly Alias|Wavefront) and currently owned and developed by Autodesk, Inc. It is used to create interactive 3D applications, including video games, animated film, TV series, or visual effects. The product is named after the Sanskrit word Maya, the Hindu concept of illusion.

XVII In cinematography, match moving is a visual-effects, cinematic techniques that allows the insertion of computer graphics into live-action footage with correct position, scale, orientation, and motion relative to the photographed objects in the shot. The term is used loosely to refer to several different ways of extracting motion information from a motion picture, particularly camera movement. Match moving is related to rotoscoping and photogrammetry. It is sometimes referred to as **motion tracking.** The first step is identifying and tracking features. A feature is a specific point in the image that a tracking algorithm can lock onto and follow through multiple frames (SynthEyes calls them blips). Often features are selected because they are bright/dark spots, edges or corners depending on the particular tracking algorithm. Popular programs use template matching based on NCC score and RMS error. What is important is that each feature represents a specific point on the surface of a real object. As a feature is tracked it becomes a series of two-dimensional coordinates that represent the position of the feature across a series of frames. This series is referred to as a track. Once tracks have been created they can be used immediately for 2D motion tracking, or then be used to calculate 3D information.

For instance, for a bunch of anatomy shots, we literally made belly part of Warrior's body. After the shooting got done, we began this task, since we had to "destroy" the armor. First, we used several thick foam boards to fill with the armor looking like a section of real body. Then we dug a hole in the middle and colored for a real horrible mangled texture. Later, we took pictures with different angle to match the perspective in the footage (figure32). (Because Warrior lay on the bed without move, so the still pictures can meet the post requirements.) Of course the final step is compositing by Photoshop and After Effects. These tasks almost occupied 40% of the workload.

Figure 32

Also I want to give an example how we used 2D special effect to fix some shots with inherent defects. One shot is that Warrior sitting on the bed stab his chest with a dagger. For the convenience of the tracking the bloodstain on Warrior's white shirt, we marked on his short with green gaffer tape. No one thought this "smart" act is going to be a disaster in the post. However the fact told us the green tape cannot be tracked by After Effects[XVIII] in the low key light, also because the cloth is soft material. When Warrior moved his body, the folds would appear on the green tape area, that's another reason of this method is a mistake.

After we recognized this issue, we tried our best to solve this problem and we even thought about tracking by hand which means adjusting the position, shape and scale frame by frame, but the result is really terrible, the bloodstain didn't move with the shirt and shook badly. Therefore we needed to change our thinking. One idea came

XVIII Match moving has two forms. Compositing programs, such as Shake, Adobe After Effects and Discreet Combustion, have **two-dimensional motion tracking** capabilities. This feature translates images in two-dimensional space and can add effects such as motion blur in an attempt to eliminate relative motion between two features of two moving images. This technique is sufficient to create verisimilitude when the two images do not include major changes in camera perspective. For example a billboard deep in the background of a shot can often be replaced using two-dimensional tracking.

up in my mind: if we cannot cover the green tape, why not cover whole screen? When Warrior stabbed his chest, blood splashed out on the lens, so if we made a mass of “blood” to “color” the lens by After Effects, the green tape was gonna be covered certainly. As you know the result of this decision is very bloody and powerful. It is most important that this easy way fix our serious problem. (figure 33)

Figure 33

■ **Pull out frames to achieve the better action**

As I mentioned before, we used burst shutter to achieve the new pixilation style rather than traditional way. Therefore, the footage we got from the site is very smooth and “limited” on the pixlilation aesthetic aspect. As for experimental film, the visual effect seems the most important thing the filmmakers pursue. The effect that doctors’ and red stars’ action bring to audience suppose to be creepy, supernatural, mechanical and cartoon-like, so I have to improve their physical motion by pulling out frames. No doubt, this work needs to be done by someone who knows animation technique very well. However I have to undertake this task as a layman because everyone is very busy at that period of time. The first thing I did at is learning some basic principle of animation such as timing, slow in and slow out, exaggeration etc. Then I used Final Cut Pro to take out some intermediate frames. The basic workflow as blow

1 How many times I need to copy the frames within shot by shot? This depends on the speed of action you want.

2 Which frame I should remove it? It depends on the complicated acting elements.

3 Which frame needs to be put back and why does frame need to be reordered?

4 Adjusted Image sequences will be imported into video.

The 3rd point I need to elaborate a little bit. Some people will ask why you put the frames back after remove it. The answer is creating more interesting action details. For example (figure) when the general got a load of the treasure in his hand, he tilt

his head from the left to the right. In order to exaggerate this tiny motion and make it more interesting, I copied these frames and invert them. After putting these frames “created ” behind the original ones, the action became general tilted his head repeatly showing his cartoon looking and making him more greedy. This motion was enriched largely.

Be honest, I really don't want to this task again. Since adjusting frames is a large amount of work also very difficult to be accomplished since it’s delicate enough. Anyhow, this work absolutely made this work much better and trained myself being patient and sharp-eyed like an animator.

■**Unusual workflow in *Terra Cotta Warrior*’s post**

The following workflow is kind of explored by us. From here you can see in an pixilation experimental film’s production, we have to do experiment on the art aspects also on workflow.

● Overview the footage

It contains dividing pictures into folders (one folder represents one shot), importing image sequence into Quick Time to .mov files with compressing, and edit these shots together according the shot list. Through this process, the initial feeling would come out, which is good for controlling the speed of pixilation.

● Pull out frames

The workload of this process occupied 50% of the whole post work. The purpose of this workflow is improving the visual effect of physical and facial action, even create fresh feeling of the characters.

● Meet with special effects supervisor and give him footage without compressed

This step is very important, since it's the key that directly affects the visual effect. First, we discussed which shot needs special effect. Some of them are designed as special effect shots and some need to be fixed since some objective limits and mistakes on the shooting site. Second, we discussed the specific technique that suppose to apply on each shot. Moreover, I want to emphasize that large sized files are necessary for the compositing work, because picture quality will be lost some in this process.

● Preparation for composition

Basically, the 2D animation applied in the film, which was acted by real person, is "pieced together" by ready-made pictures. The perspective matching is the key when we took pictures, which is the precondition of the composition.

Of course before that we made a torso of the Warrior. Also we made two stop motion shots as the materials of the composition later.

- Compositing
- Edit prepared shots together and create the picture lock[XIX]
- Color correction

SOUND EFFECT DESIGN AND MUSIC

No doubt, sound and music play very significant roles in a film, which can bring the audience something the visual aspects cannot convey.

In *Terra Cotta Warrior,* there is no dialogue. Therefore, the music and sound are extremely important for this film. It can help to control the rhythm also emphasize the theme of this film I tried to convey.

■Sound design

Sound effect work was begun very early in *Terra Cotta Warrior*, because for an animation film, in which the sound cannot be recorded synchronously on the site, the workload of sound effect might be really heavy. Hayden Blackmon who is a undergrad in our department, who showed very strong interests to this work and he did great job in this film. I met Hayden before the shooting and we talked a lot about the style of this film and the sound elements we might introduce to serve this style. In this highly creative process, we still held the attitude to make sound experiments and a lot of fresh idea came out. For instance, when the General move the Warrior's head during the examination, the sound effect we imagined is the rub of bricks, which indicates the Warrior is made with clay, also implies crispness and weakness of the Warrior.

For saving time, sound effect work was going on at the same time with shooting. After we listed every sound effect for every shot, Hayden can find some files in sound library such as the background noise including the wind, owls and rain etc., even though he couldn't see the pictures yet. When the ready-made sound got prepared, we went into Foley[XX] stage. The Warrior's step, rustling sound of cloth,

XIX **Picture lock** is a stage in editing a film or editing a television production. It is the stage prior to on-line editing when all changes to the film or television program cut have been done and approved. It is then sent to subsequent stages in the process, such as online editing and audio mixing. Any last minute changes can force portions of subsequent work to be re-done. Not every production necessarily obeys picture lock. A director or executives in charge may change their minds and ask for additional changes to be made.

XX **Foley** is a term that describes the process of live recording of sound effects that are created by a Foley artist, which

Doctors sliding on the ground, the axe hitting on the Warrior's belly and so on need to accomplished in this process. We gave a lot of try of using the different material and things to achieve the best result within our reach. The last step is mixing[XXI], Protools is what we used, which is a powerful tool for sound mixing.

■ **Music**

As you imagine the composing of the experimental film like *Terra Cotta Warrior* is very hard. If the music's tone or style don't match the vision or the theme, this piece will ruin the film. Thus when I decided to use the traditional Chinese style in this film, the result is unpredictable in my eyes. However, with confidence, I instated my idea about using Chinese traditional instruments, such as vertical bamboo flute , guqin, zither to my composer Stephen Bullen, he liked it a lot. Through discussing, we figured out it was a very proper way to interpret this film since the Chinese traditional instruments have native characteristics to create the sad, deep and prolonged sound color. Later, we got through every detail of the film and figured out adding music on which part and what kind of tone the individual part suppose to match. Because it's difficult to find players and these kind of instruments in U.S. Stephen found the separated notes of these instruments played in sound library. His efforts and talents make my idea come true.

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TERRA COTTA WARRIOR SHOT LIST

1. ***L*** One hand stops a spinning globe at the position of China **ECU**
2. ***P*** A man who sits in front of a ropey table leans forward and his hand is on the globe. His face becomes visible as it moving forward. He gazes globe intently. **MS**
3. ***L*** Globe reverse. **ECU**
4. ***P*** He turns his head slowly and unconcernedly to the door where the sound comes from and an assistant come up to whisper to the doctor and goes away. **CU**
5. ***P+L*** Terra-Cotta Warrior stands in front of the door for a second and he steps towards the doctor at the same time the assistant passes by him. **OS**
6. ***C+L*** Terra-Cotta Warrior steps forward, the "skin" on his chest peels off. **DOLLY+CU**

Add the green mark around where the skin peels off.

7. ***L*** Terra-Cotta Warrior walks toward to the doctor. **MASTER**

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are added in post production to enhance the quality of audio for films, television, video, video games and radio.

XXI In audio recording, **audio mixing** is the process by which multiple recorded sounds are combined into one or more channels, most commonly two-channel stereo. In the process, the source signals' level, frequency content, dynamics, and panoramic position are manipulated and effects such as reverb may be added. This practical, aesthetic, or otherwise creative treatment is done in order to produce a mix that is more appealing to listeners.

8. ***L*** Terra-Cotta Warrior sits down on the doctor's opposite **MS**

9. ***P*** Doctor looks him up and down for several seconds and stands up and comes up.**MS**

10.***P*** A group of examination shots (eyes, and mouth) **CU**

11.***P*** Doctor uses the stethoscope on Warrior's chest. A piece of "skin" peels off, the gold is exposed. **CU**

12.***P*** Doctor's surprising face. **CU**

13.***P*** Doctor moves towards to the dark, several doctors pop up around him. They discuss something secretly in the dark. (Terra-Cotta Warrior is foreground)

14.***P*** Terra-Cotta Warrior is in the X-Ray examination, the doctor holds the screen in front of his chest. (underneath to top) **FS**

15.***C*** Camera goes into Warrior's belly. From underneath to the top. Some Organs are passed by. They are valuable antique of china. **C**

Camera zooms on the screen to blur.

16.***P*** As doctor moving the X-ray screen, their smile freeze and are replaced by confusion. **CU(C)**

17.***C*** The screen shows a sphere wrapped by gauze is beating. (zoom in until black) **CU**

18.***P*** Operating lamp strike suddenly, several doctors show their creepy smile and then move away. **Warrior's POV**

19.***P*** (Camera looks down) Doctors and assistants move around and take the different medical equipment from other place. (Time lapse) **MASTER**

20.***P*** several doctors come back and one of them raises up a hammer (**Slow mo**) and hit on warrior's belly and the clay fragments and blood fly up (**Slow mo**) **Warrior's POV**

21.***L*** Suffering on Warrior's face (slow mo). **MS**

22.***P*** The doctor wears his gloves. **FS**

23.***C+P*** His hand goes into the big hole on his belly, and takes out a bunch of jewel necklaces.(the action suppose to be very slow to show the doctors' nervous and exciting emotion) **CU**

24.***P*** The doctor holds the treasures in front of his face and gazes them. Creepy smile on their faces. **MASTER**

25.***L*** Warrior's face. He's suffering and surprised. **CU**

26.***P*** An assistant takes the necklace away. The doctor begins to put his hand in the hole again.

MASTER

27.***P*** The hand seizes a porcelain jar from the hole. **CU**

28.***L*** Warrior's sad, suffering and angry face. **CU**

29.***P*** Doctors enjoy the treasure. (Warrior's head is foreground)

30.***P+L+C*** A group of shots: different angle of shots that the doctor takes several "organs" (**MASTER** and **CU**) and their expressions (**CU**), insert the shots that a hand put the treasure on the operating tray one by one (**CU**) and Warrior's face. (**MASTER** and **CU**) (Warrior's attitude changing: surprised→sad+angry→cannot help it→without

any expression).

Special effect refers to shot 24.

31.***P+C*** The doctor puts his hand into the hole and fumbles around. He touches something. (sound effect of beating) His action becomes careful. (viewer really can see his hand fumble in the belly) **CU**

Green (blue?) screen

32.***P+C*** His hand takes the gauze ball out. It's still beating. The doctor holds the "heart" in his hands in front of his surprising face. **CU**

Rotoscope.

33.***P*** Warrior's face without any expression. His appearance change a little bit, the clay on his face fade, and some parts of his armor peel off too. The doctor moves away from operating table and puts the heart on the lab table. He begins to unwrap the "heart". **DOLLY**

How can let the heart beating when unwrap it?

34.***C*** The moving images fade in on the gauze. **CU(C)**

Gauze ball suppose to be a roll. Special effect is difficult, and how to combine 24f/s to 6f/s.

35.***P*** The doctor's confusing and surprising face. **CU**

36.***P*** The doctor begins to unwrap the last layer of gauze. **CU**

37.***P+C*** The doctor holds the heart in his hand in front of his face. The heart gives off some light leaking off from his fingers. Viewer cannot see what is in his hand. Doctor turns his head suddenly to the door, because of weird sound. **CU**

38.***P*** A group of armed people with red star heads break in, Doctor is the foreground. **MASTER**

39.***P*** Camera looks down; a lot of people go into the door. **MASTER**

40.***P*** Several people encircle one of the doctors and cover him. When they move to another place, doctor lies on the ground and dead. **FS or MS**

41.***P*** A group of shots to show 40 by different angles in different places. **FS or MS**

42.***P*** A doctor hides under the table and holding several antiques. He looks around carefully and escapes from the door.

43.***P*** The main doctor lies on the ground with several armed people around. He still holds the heart in his hand **FS**

44.***P*** His hand holds the heart. But the viewer just can see the light leak out of his fingers, rather than seeing the heart. **CU**

45.***P*** One of the red stars crouches to take the heart from the doctor's hand and stands up. He moves away with the heart. **FS**

46.***P+C*** The leader red star warps the heart with gauze again (foreground out of focus); the warrior still lies there with eyes closed and he becomes half Terra-Cotta and half human being. The curve in the heart beating monitor is a straight line. Changing focus: warping the heart something (communist staff) shows up on the gauze again (on focus); Warrior is out of focus.

47.***P*** He puts the gauze heart into warrior's belly again. **CU**

48.***L+C*** The warrior has tiny expressions on his face, and the monitor's curve comes back to normal situation. He opens his eyes. **CU**

49.***P*** One of the red stars takes a tray of gears and stops by the operation table. The leader red star wears the gloves and puts the gears into belly and installs them. (Warrior's POV) **MS**

50.***P*** A group of shots: installing the gears and taking out the antique left in his belly. **CU**

51.***P*** The leader red star finishes the operation and takes off the gloves. **MS**

52.***L+P*** The warrior, who is almost a human being, begins to feel hurting on his chest. He suffers and struggles on the operation table (zoom out), and red star leave. **FS**

53.***L*** The Warrior cannot stand the pain anymore and he uses a knife and is going to cut himself. **MS**

54.***L*** He cuts his skin and takes out the gauze heart out. (shoot in his back) **MS**

55.***S*** The gauze keeps tightening. **CU**

How?

56.***L*** He tears the gauze and throws them away. (shoot in his back) **MS**

57.***L*** When he unwraps the last layer of gauze, steamed bread is exposed. He begins to eat it. **ZOOM OUT**

PART OF *TERRA COTTA WARRIOR* SHOT LIST BREAK DOWN

Section 2

Warrior+Doctors:

19. ***P*** (Camera looks down) Doctors and assistants move around and take the different medical equipment from other place. (Time lapse) **MASTER**

24. ***P*** The doctor holds the treasures in front of his face and gazes them. Creepy smile on their faces. **MASTER**

26. ***P*** An assistant takes the necklace away. The doctor begins to put his hand in the hole again. **MASTER**

29. ***P*** Doctors enjoy the treasure. (Warrior's head is foreground)

30. A group of shots: different angle of shots that the doctor takes several "organs" **MASTER** and **CU**

31. ***P+C*** The doctor puts his hand into the hole and fumbles around. **CU**

Green (blue?) screen

32. ***P+C*** His hand takes the gauze ball out. It's still beating. The doctor holds the "heart" in his hands in front of his surprising face. **CU**

Rotoscope.

33. ***P*** Warrior's face without any expression. His appearance change a little bit, the clay on his face fade, and some parts of his armor peel off too. The doctor moves away from

operating table and puts the heart on the lab table. He begins to unwrap the “heart”.

DOLLY

How can let the heart beating when unwrap it?(move to the end of shooting)

Warrior:

21. ***L*** Suffering on Warrior’s face (slow mo).(move after 20) **MS**

25. ***L*** Warrior’s face. He’s suffering and surprised. **CU**

28. ***L*** Warrior’s sad, suffering and angry face. **CU**

30***. L*** A group of shots: Warrior’s face. (**MASTER** and **CU**) (Warrior’s attitude changing: surprised→sad+angry→cannot help it→without any expression).

PART OF SOUND NOTE

00:00

Spinning globe noise

00:08

Leaning forward noisy from wooden chair and table, the sound of opening door, foot steps, wind noisy (part of ambience).

00:20

Slide on the ground, whispering, clothes

00:35

Foot steps, armor’s sound, slide on the ground, close the door, clothes

01:02

Clay fragments drops down

01:12

Touching globe, touching table, siting on the wooden chair

01:24

Standing up from the wooden chair, sliding on the ground, cloth, touch face, breath, armor, wearing stethoscope, stethoscope touching armor.

01:55

Skin peels off, sound effect of golden light shining and the skin recovering, Jim surprising.

02:07

Sound effects of doctors pop up, cloth, slide away, creepy whispering, sound effect leaning back.

02:31

Scanning noisy, giggle, sound effect of camera goes in, inner environments ambience, camera comes out, creepy giggle，sound effect of gauze ball appear, heart beating.

02:57

Noisy of turning on the light, slide on the ground, creepy laughter.

03:03

Sound effect of preparation work ， dream like low frequency drone (lasting until wearing gloves)
03:32
Maybe music comes in?? Raise axe, swing, chopping, blood splashing (repeat 3 times)
03:47
Wearing gloves
03:50
Sound effects of putting hand into warrior's belly.
04:17
Sound effects of ancient battle filed, low frequency heavy breath.
05:05
Heart beating
Music is still going on.

FILM REFERENCES

Realist symbolic styles:

Mathew Barney: hard to find his Cremaster Series (best to see Cremaster III)-- you'd have to find it as a bootleg. There are clips on a DVD at the Wallace: http://albert.rit.edu/search/Y?SEARCH=cremaster&SORT=D&searchscope=2

Pan's Labrinth (Gullermo del Toro)-- just for the fantasy sequences; in the library: http://albert.rit.edu/search~S2?/YLabyrinth&SORT=D&searchscope=2/YLabyrinth&SORT=D&searchscope=2&SUBKEY=Labyrinth/1%2C3%2C3%2CB/frameset&FF=YLabyrinth&SORT=D&searchscope=2&3%2C3%2C

And always the classic, 'Meshes of the Afternoon' by Maya Derren: (YouTube)
Meshes of the Afternoon 1

Fantastical symbolic styles:

Tetsuo the Iron Man (also uses pixilation combined with live action)
http://www.imdb.com/title/tt0096251/

Guy Maddin-- you can check out one of his short films on this DVD in the library: http://albert.rit.edu/search~S2?/Yguy+maddin&SORT=D&searchscope=2/Yguy+maddin&SORT=D&searchscope=2&SUBKEY=guy%20maddin/1%2C2%2C2%2CB/frameset&FF=Yguy+maddin&SORT=D&searchscope=2&2%2C2%2C

Pixilation styles:

The Secret Adventures of Tom Thumb
The Secret Adventures of Tom Thumb 1:6

Svankmajer's 'Down to the Cellar' is on this
DVD: http://albert.rit.edu/search~S2?/Ysvankmajer&searchscope=2&SORT=DZ/Ysvankmajer&searchscope=2&SORT=DZ&extended=0&SUBKEY=svankmajer/1%2C7%2C7%2CB/frameset&FF=Ysvankmajer&searchscope=2&SORT=DZ&5%2C5%2C

More art gallery style fantastical symbolic:

Zoe Beloff
http://www.ubu.com/film/beloff.html

BUDGET

Title:	*Terra Cotta Warrior*	**Director**:	Bin Li
Advisor:	Carl Battaglia	**Producer**:	Bin Li
Start date:	Oct-2010	**Format**:	HD video
End Date:	Nov-2011	**Run time**:	Appx. 12 minutes
Budget:	**$6,135.25**		

Account#	**Quantity**	**Fee**	**Subtotal**	**Acct. Total**
100 Story				**$0**
Script	1	$0	$0	
200 Talent				**$100**
Producer		$0	$0	
Director		$0	$0	
Cast		$100	$100	
300 Production Personnel				**$200**
Director of Photography		$0	$0	
Gaffer		$0	$0	
Grip		$0	$0	
Art Director	2	$100	$200	
Sound mixer and Boom op		$0	$0	
Assistant director		$0	$0	
Animators		$0	$0	

Compositors		$0	$0	
editor		$0	$0	
400 Travel and Location				**$1,760**
Cast and Crew Meals	Avg. $10 ppd	$100/day	$1200	
Location fee		$200	$200	
Petty Cash	12days	$20	$240	
Auto Mileage	Avg.8miles/day	$10/day	$120	
500 Production Equipments				**$100**
Camera & Support		$0	$0	
Lighting		$0	$0	
Grip		$100	$100	
600 Art Direction				**$2,000**
Props		$500	$500	
Set Dressing		$500	$500	
Makeup Supplies		$200	$200	
Costume		$500	$500	
Postage		$300	$300	
700 Sound				**$100**
Sound design		$0		
Composer		$100		
800 Editing and Finishing				**$200**
Editor		$0		
Sound Editing		$0		
Music Rights for sound		$0		
Hard Drive			$200	
900 Final Post Production				**$875**
Shipping			$100	
Duplicating	20 DVD	$25/pack	$25	
Posters			$150	
Festival Fees			$600	

			Subtotal:	**$5,335**
1000 Contingency				
Contingency			15%	**$800.25**
			Total:	**$6,135.25**

REFERENCES

Beginner's Guide to Animation: Everything you Need to Know to get Started
Mary Murphy, Watson-Guptill (October 14, 2008)

China: A New History.
John K. Fairbank with Merle Goldman
Enl. ed. Cambridge, MA: Belknap Press of Harvard University Press, 1992.

www.wikipedia.org

The Animation of Jan Svankmajer at Keyframe - the Animation Resource

A History of Experimental Film and Video
A.L.Rees, British Film Institute; Second Edition,Revised Edition,2nd edition edition (November 22, 2011)

Experimental Film and Video: An Anthology
Jackie Hatfield, John Libbey Publishing (August 9, 2006)